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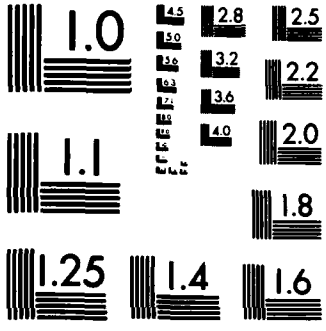

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The view, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The effect of coupling agent on the performance of glass fiber composites has been investigated from the mechanical and molecular viewpoint.

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A. Statement of Problem Studied.

We investigated the molecular basis of the hydrothermal instability of glass reinforced composites.

B. Summary of Most Important Results.

The effect of aminosilane coupling agents on the mechanical strength and hydrothermal stability of the interfacial bond strength of glass monofilament-epoxy resin composites has been investigated, using a monofilament pullout technique. A mechanical test system utilizing a glass monofilament composite has been developed in order to measure quantitatively the interfacial strength of the composite

Varying concentrations of different bifunctional aminosilanes are used for treating the glass monofilament. The treated monofilament, partially embedded in an epoxy matrix, is sheared in the direction of the monofilament by means of a pullout force, giving the shear debonding stress of the interface. To investigate the hydrothermal effect, the composite is immersed in 95°C water for varying periods of time, and the interfacial strength is determined. The effect of partial removal of the deposited aminosilane, prior to compositing, has also been studied. The treated monofilament is immersed in 95°C water for 4 hours, prior to composite preparation, and its interfacial strength is compared with the corresponding unmodified composite.

The use of a bifunctional silane coupling agent improves the mechanical strength and hydrothermal resistance of the interface. Partial removal of the deposited aminosilane, irrespective of its original thickness, enhances the interfacial strength of the composite to an optimum value. It is found that N-2-aminoethyl-3-aminopropyl trimethoxy silane (AAPS) imparts the most favorable results in comparison with 3-aminopropyl triethoxy silane (APS), and N-methylaminopropyl triethoxy silane (MAPS).

C. Publications.

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C. Publications continued...

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D. Participating Scientific Personnel.

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Chwan-Hwa Chiang, Ph.D., 1980

Hamid Emadipour, M.S., 1983

Yih-Tyan Liao, Ph.D. (to be received)

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